

We claim:

5015 1. In a data communication network comprising a plurality of optical label switching routers and fiber optic links between said optical label switching routers, a method of representing optical network bandwidth, said method comprising:

4 assigning an optical label to a channel group, said channel group using one of said fiber optic links and comprising a plurality of channels;

6 encoding said optical label so as to comprise a type field, a length field and a value field, where said value field comprises a label component and where said label component comprises an indication of bandwidth on each of said plurality of channels.

1 2. The method of claim 1 wherein said indication of bandwidth identifies said one of said fiber optic links and a wavelength on said one of said fiber optic links.

1 3. The method of claim 2 wherein said indication of bandwidth further identifies said channel group.

1 4. The method of claim 3 wherein said bandwidth on each of said plurality of channels is represented by a single bit.

1 5. The method of claim 4 wherein a bit value of zero indicates available bandwidth on a given one of said plurality of channels.

1 6. In a data communication network comprising a plurality of optical label switching routers and fiber optic links between said optical label switching routers, a method of representing traffic characteristics of an interface between a node in a service network and one of said optical label switching routers, said method comprising:

5 encoding a representation of said traffic characteristics of said interface so as to comprise a type field, a length field and a value field, where said value field comprises an attribute.

1 7. The method of claim 6 wherein said attribute comprises an indication of a service type of said service network.

1 8. The method of claim 6 wherein said attribute comprises an indication of a control
2 protocol of said service network.

1 9. In a data communication network comprising a plurality of optical label switching routers
2 and fiber optic links between said optical label switching routers, a method of representing
3 characteristics of an optical trail, said method comprising:

4 encoding a representation of said characteristics of said optical trail so as to comprise
5 a type field, a length field and a value field, where said value field comprises a
6 channel group description; and

7 where said channel group description comprises an indication of channel group type
8 and an indication of a number of members in said channel group.

1 10. In a data communication network comprising a plurality of optical label switching routers
2 and fiber optic links between said optical label switching routers, a method of specifying
3 session parameters for an optical communication session over one of said fiber optic links,
4 where said one of said fiber optic links originates at an originating label switching router, said
5 method comprising:

6 encoding a specification of said session parameters so as to comprise a type field, a
7 length field and a value field, where said value field comprises a range component;
8 and

9 said range component comprises:

10 an identity of one of said fiber optic links;

11 a lower bound of a block of wavelengths supported by said originating label
12 switching router on said one of said fiber optic links; and

13 an upper bound of said block of wavelengths supported by said originating
14 label switching router on said one of said fiber optic links.

1 11. A data structure for use in communicating information regarding a plurality of channels
2 from a first label switching router to a second label switching router comprising:

3 a type field;
4 a length field; and
5 a value field;
6 where said value field comprises a label component, and said label component
7 comprises an indication of bandwidth on each of said plurality of channels.

1 12. A data structure for use in communicating information regarding an interface between a
2 node in a service network and a label switching router in a label switching network,
3 comprising:

4 a type field;
5 a length field; and
6 a value field;
7 where said value field comprises an attribute and where said attribute comprises an
8 indication of a service type of said service network.

1 13. A data structure for use in communicating information regarding an interface between a
2 node in a service network and a label switching router in a label switching network,
3 comprising:

4 a type field;
5 a length field; and
6 a value field;
7 where said value field comprises an attribute and where said attribute comprises an
8 indication of a control protocol of said service network.

1 14. A data structure for use in communicating information regarding an optical label
2 switching path from a first label switching router to a second label switching router
3 comprising:

a type field;

a length field; and

a value field;

where said value field comprises a channel group description and where said channel group description comprises an indication of channel group type and an indication of a number of members in said channel group.

15. A data structure for use in communicating information regarding session parameters for an optical communication session over a fiber optic link from an originating label switching router to a receiving label switching router comprising:

a type field;

a length field; and

a value field;

where said value field comprises a range component and said range component comprises:

an identity of said fiber optic link;

a lower bound of a block of wavelengths supported by said originating label switching router on said fiber optic link; and

an upper bound of said block of wavelengths supported by said originating label switching router on said fiber optic link.

16. An optical label switching router operable to:

assign an optical label to a channel group, said channel group using one of a plurality of fiber optic links and comprising a plurality of channels;

encode said optical label so as to comprise a type field, a length field and a value field, where said value field comprises a label component and where said label

6 component comprises an indication of bandwidth on each of said plurality of
7 channels.

1 17. An optical label switching router operable to:

2 encode a representation of characteristics of traffic over an interface between a node
3 in a service network and said optical label switching router so as to comprise a type
4 field, a length field and a value field, where said value field comprises an attribute of
5 said traffic.

1 18. An optical label switching router operable to:

2 encode a representation of characteristics of an optical trail of a channel group so as to
3 comprise a type field, a length field and a value field, where said value field
4 comprises a description of said channel group; and

5 where said description of said channel group comprises an indication of a type of said
6 channel group and an indication of a number of members in said channel group.

1 19. An optical label switching router operable to:

2 encode a specification of session parameters for an optical communication session
3 over a fiber optic link so as to comprise a type field, a length field and a value field,
4 where said value field comprises a range component;

5 where said range component comprises:

6 an identity said fiber optic link;

7 a lower bound of a block of wavelengths supported by said label switching
8 router on said fiber optic link; and

9 an upper bound of said block of wavelengths supported by said label switching
10 router on said fiber optic link.

1 20. A computer readable medium for providing program control for an optical label switching
2 router, said computer readable medium adapting said optical label switching router to be
3 operable to:

4 assign an optical label to a channel group, said channel group using one of a plurality
5 of fiber optic links and comprising a plurality of channels;

6 encode said optical label so as to comprise a type field, a length field and a value
7 field, where said value field comprises a label component and where said label
8 component comprises an indication of bandwidth on each of said plurality of
9 channels.

1 21. A computer readable medium for providing program control for an optical label switching
2 router, said computer readable medium adapting said optical label switching router to be
3 operable to:

4 encode a representation of characteristics of traffic over an interface between a node
5 in a service network and said optical label switching router so as to comprise a type
6 field, a length field and a value field, where said value field comprises an attribute of
7 said traffic.

1 22. A computer readable medium for providing program control for an optical label switching
2 router, said computer readable medium adapting said optical label switching router to be
3 operable to:

4 encode a representation of characteristics of an optical trail of a channel group so as to
5 comprise a type field, a length field and a value field, where said value field
6 comprises a description of said channel group; and

7 where said description of said channel group comprises an indication of a type of said
8 channel group and an indication of a number of members in said channel group.

1 23. A computer readable medium for providing program control for an optical label switching
2 router, said computer readable medium adapting said optical label switching router to be
3 operable to:

4 encode a specification of session parameters for an optical communication session
5 over a fiber optic link so as to comprise a type field, a length field and a value field,
6 where said value field comprises a range component; and

11 an upper bound of said block of wavelengths supported by said label switching
12 router on said fiber optic link.

Year	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
Population	1,000,000	1,050,000	1,100,000	1,150,000	1,200,000	1,250,000	1,300,000	1,350,000	1,400,000	1,450,000	1,500,000	1,550,000	1,600,000	1,650,000	1,700,000	1,750,000	1,800,000	1,850,000	1,900,000	1,950,000	2,000,000	2,050,000	2,100,000	2,150,000	2,200,000	2,250,000	2,300,000	2,350,000	2,400,000	2,450,000	2,500,000	2,550,000	2,600,000	2,650,000	2,700,000	2,750,000	2,800,000	2,850,000	2,900,000	2,950,000	3,000,000	3,050,000	3,100,000	3,150,000	3,200,000	3,250,000	3,300,000	3,350,000	3,400,000	3,450,000	3,500,000	3,550,000	3,600,000	3,650,000	3,700,000	3,750,000	3,800,000	3,850,000	3,900,000	3,950,000	4,000,000	4,050,000	4,100,000	4,150,000	4,200,000	4,250,000	4,300,000	4,350,000	4,400,000	4,450,000	4,500,000	4,550,000	4,600,000	4,650,000	4,700,000	4,750,000	4,800,000	4,850,000	4,900,000	4,950,000	5,000,000	5,050,000	5,100,000	5,150,000	5,200,000	5,250,000	5,300,000	5,350,000	5,400,000	5,450,000	5,500,000	5,550,000	5,600,000	5,650,000	5,700,000	5,750,000	5,800,000	5,850,000	5,900,000	5,950,000	6,000,000	6,050,000	6,100,000	6,150,000	6,200,000	6,250,000	6,300,000	6,350,000	6,400,000	6,450,000	6,500,000	6,550,000	6,600,000	6,650,000	6,700,000	6,750,000	6,800,000	6,850,000	6,900,000	6,950,000	7,000,000	7,050,000	7,100,000	7,150,000	7,200,000	7,250,000	7,300,000	7,350,000	7,400,000	7,450,000	7,500,000	7,550,000	7,600,000	7,650,000	7,700,000	7,750,000	7,80																																																																